CALIFORNIA HIGH-SPEED TRAIN

Program Environmental Impact Report/Environmental Impact Statement

Los Angeles - Orange County - San Diego

PUBLIC UTILITIES TECHNICAL EVALUATION

January 2004

Prepared for:

California High-Speed Rail Authority

U.S. Department of Transportation
Federal Railroad Administration

CALIFORNIA HIGH SPEED RAIL AUTHORITY

U.S. Department of Transportation
Federal Railroad Administration

CALIFORNIA HIGH-SPEED TRAIN PROGRAM EIR/EIS

Los Angeles - Orange County - San Diego

Public Utilities
Technical Evaluation

Prepared by:

HDR

for

IBI GROUP

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ACRONYMS

ADL	Aerially Deposited Lead
ASTM	American Society of Testing and Materials
AUTHORITY	California High-Speed Rail Authority
AWP	Annual Work Plan
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COG	Council of Governments
CPUC	California Public Utilities Commission
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Environmental Site Assessment
FAA	Federal Aviation Administration
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HST	High-Speed Train
LAX	Los Angeles International Airport
LBP	Lead Based Paint
LOSSAN	Los Angeles to San Diego Conventional Rail Corridor
MTA	Metropolitan Transportation Authority
NGA	Natural Gas Act
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List
RTP	Regional Transportation Plan
RWQCB	Regional Water Quality Control Board
SPL	State Priority List
SWLF	Solid Waste Landfill
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service

1.0 INTRODUCTION

The California High-Speed Rail Authority (Authority) was created by the Legislature in 1996 to develop a plan for the construction, operation, and financing of a statewide, intercity high-speed passenger train system.[1] After completing a number of initial studies over the past six years to assess the feasibility of a high-speed train system in California and to evaluate the potential ridership for a variety of alternative corridors and station areas, the Authority recommended the evaluation of a proposed high-speed train system as the logical next step in the development of California's transportation infrastructure. The Authority does not have responsibility for other intercity transportation systems or facilities, such as expanded highways, or improvements to airports or passenger rail or transit used for intercity trips.

The Authority adopted a *Final Business Plan* in June 2000, which reviewed the economic feasibility of a 1,127-kilometer-long (700-mile-long) high-speed train system. This system would be capable of speeds in excess of 321.8 kilometers per hour (200 miles per hour [mph]) on a dedicated, fully grade-separated track with state-of-the-art safety, signaling, and automated train control systems. The system described would connect and serve the major metropolitan areas of California, extending from Sacramento and the San Francisco Bay Area, through the Central Valley, to Los Angeles and San Diego. The high-speed train system is projected to carry a minimum of 42 million passengers annually (32 million intercity trips and 10 million commuter trips) by the year 2020.

Following the adoption of the Business Plan, the appropriate next step for the Authority to take in the pursuit of a high-speed train system is to satisfy the environmental review process required by federal and state laws which will in turn enable public agencies to select and approve a high speed rail system, define mitigation strategies, obtain necessary approvals, and obtain financial assistance necessary to implement a high speed rail system. For example, the Federal Railroad Administration (FRA) may be requested by the Authority to issue a *Rule of Particular Applicability*, which establishes safety standards for the high-speed train system for speeds over 200 mph, and for the potential shared use of rail corridors.

The Authority is both the project sponsor and the lead agency for purposes of the California Environmental Quality Act (CEQA) requirements. The Authority has determined that a Program Environmental Impact Report (EIR) is the appropriate CEQA document for the project at this conceptual stage of planning and decision-making, which would include selecting a preferred corridor and station locations for future right-of-way preservation and identifying potential phasing options. No permits are being sought for this phase of environmental review. Later stages of project development would include project-specific detailed environmental documents to assess the impacts of the alternative alignments and stations in those segments of the system that are ready for implementation.

The decisions of federal agencies, particularly the Federal Railroad Administration (FRA) related to high-speed train systems, would constitute major federal actions regarding environmental review under the National Environmental Policy Act (NEPA). NEPA requires federal agencies to prepare an Environmental Impact Statement (EIS) if the proposed action has the potential to cause significant environmental impacts. The proposed action in California warrants the preparation of a Tier 1 Program-level EIS under NEPA, due to the nature and scope of the comprehensive high-speed train system proposed by the Authority, the need to narrow the range of alternatives, and the need to protect/preserve right-of-way in the future. FRA is the federal lead agency for the preparation of the Program EIS, and the Federal Highway Administration (FHWA), the U.S. Environmental Protection Agency (EPA), the U.S. Corps of Engineers (USACE), the Federal Aviation Administration (FAA), the U.S. Fish and Wildlife Service (USFWS), and the Federal Transit Administration (FTA) are cooperating federal agencies for the EIS.

A combined Program EIR/EIS is to be prepared under the supervision and direction of the FRA and the Authority in conjunction with the federal cooperating agencies. It is intended that other federal, state,

[1] Chapter 796 of the Statutes of 1996; SB 1420, Kopp and Costa

regional, and local agencies will use the Program EIR/EIS in reviewing the proposed program and developing feasible and practicable programmatic mitigation strategies and analysis expectations for the Tier 2 detailed environmental review process which would be expected to follow any approval of a high speed train system.

The statewide high-speed train system has been divided into five regions for study: Bay Area-Merced, Sacramento-Bakersfield, Bakersfield-Los Angeles, Los Angeles-San Diego via the Inland Empire, and Los Angeles-Orange County-San Diego. This Public Utilities Technical Evaluation for the Los Angeles-Orange County-San Diego Region is one of five such reports being prepared for each of the regions on the topic, and it is one of fifteen technical reports for this region. This report will be summarized in the Program EIR/EIS and it will be part of the administrative record supporting the environmental review of alternatives.

1.1 ALTERNATIVES

1.1.1 No-Project Alternative

The No-Project Alternative serves as the baseline for the comparison of Modal and High-Speed Train alternatives (Figure 1-1). The No-Project Alternative represents the state's transportation system (highway, air, and conventional rail) as it existed in 1999-2000 and as it would be after implementation of programs or projects currently programmed for implementation and projects that are expected to be funded by 2020. The No-Project Alternative addresses the geographic area serving the same intercity travel market as the proposed high-speed train (generally from Sacramento and the San Francisco Bay Area, through the Central Valley, to Los Angeles and San Diego). The No-Project Alternative satisfies the statutory requirements under CEQA and NEPA for an alternative that does not include any new action or project beyond what is already committed.

The No-Project Alternative defines the existing and future statewide intercity transportation system based on programmed and funded (already in funded programs/financially constrained plans) improvements to the intercity transportation system through 2020, according to the following sources of information:

- State Transportation Improvement Program (STIP)
- Regional Transportation Plans (RTPs) for all modes of travel
- Airport plans
- Intercity passenger rail plans (California Rail Plan 2001-2010, Amtrak Five- and Twenty-year Plans)

The No-Project Alternative for the Los Angeles-Orange County-San Diego Region includes highway expansion as well as conventional rail improvements to the existing LOSSAN corridor that are programmed and funded for implementation through 2020. Table 1-1 summarizes the infrastructure components of the No-Project Alternative for this Region. As with all of the alternatives, the No-Project Alternative will be assessed against the purpose and need topics/objectives for congestion, safety, air pollution, reliability, and travel times.

FIGURE 1-1

No-Project Alternative – California Transportation System

TABLE 1-1

PROGRAMMED IMPROVEMENTS INCLUDED IN THE NO-PROJECT ALTERNATIVE
LOS ANGELES-ORANGE COUNTY-SAN DIEGO REGION
(from 1998 and 2000 Regional Transportation Plans)

County	Type of Project	Description
INTERCITY HIGHWAY PROJECTS		
Los Angeles	HOV	HOV Project on SR-14 (Ave P-8 to Ave-L)
Los Angeles	HOV	HOV Project on I-710 (I-10 to I-210
Los Angeles	HOV	HOV Project on I-5 (SR-19 to I-710)
Los Angeles	Highway Widening	I-710 (I-10 to I-210) Additional Mixed Flow Lane
Los Angeles	Highway Widening	I-5 (Rosecrans to Orange Co) Additional Mixed Flow Lane
Los Angeles	Highway Widening	I-405 (US-101 to I-105) Additional Mixed Flow Lane
Los Angeles	Highway Widening	SR-57 (SR-60 to Orange Co) Additional Mixed Flow Lane
Orange	HOV	HOV Project on I-5 (SR-1 to Avenida Pico)
Orange	Highway Widening	I-5 (SR-91 to Los Angeles Co) Additional Mixed Flow Lane
Orange	Highway Widening	SR-91 (westbound auxiliary lane SR-57 to I-5) Additional Mixed Flow La
Orange	Highway Widening	SR-91 (auxiliary lanes SR-241 to SR-71) Additional Mixed Flow Lane
Orange	Highway Widening	SR-57 (auxiliary lanes Los Angeles Co to SR-91) Additional Mixed Flow Lane
San Diego	Highway Interchange/Widening	I-5 at I-805 – New interchange with 10 freeway and 2 HOV lanes.
San Diego	Highway Widening	I-5 from Mission Bay Drive to SR-52 – Addition of a northbound auxiliary lane.
San Diego	Highway Widening	I-5 at SR-78 Interchange: NB-EB Connector – Widen auxiliary lane and ramp.
San Diego	Highway Widening	I-15 from SR-163 to SR 78 – Addition of auxiliary lanes and meters. Bridge widening
San Diego	Highway Widening	I-15 from SR-56 to Centre City Parkway – Addition of 4 HOV/Managed lanes
San Diego	Highway Widening/HOV	I-5 from Del Mar Heights Road to Birmingham Drive – Upgrade from existing lane freeway to 12-lane freeway and 2 HOV lanes.
San Diego	Highway Interchange	I-15/SR-56 Interchange Ramp (EB-NB) – Loop ramp.
San Diego	Highway Widening/HOV	I-5 from Del Mar Heights Road to Encinitas Boulevard – Upgrade from 8-lane freeway to 12-lane freeway and 2 HOV lanes.
San Diego	Highway	I-5 from Encinitas Boulevard to La Costa Boulevard – Upgrade from 8-lane freeway to 10-lane freeway and 2 HOV lanes.
San Diego	Highway	I-15 from SR-163 to SR-56 – Addition of 4 HOV/Managed lanes.
San Diego	TSM	Intelligent Transportation Systems: Enhanced Incident/Emergency Response, Traveler/Commercial Vehicle Operations Information, and Management Syste Software.
CONVENTIONAL RAIL IMPROVEMENTS		
Los Angeles	Conventional Rail	Run through tracks at L.A. Union Station
Los Angeles	Conventional Rail	Continuous third main track from Union Station to Fullerton
Orange	Conventional Rail	Double tracking along Lincoln Avenue in Santa Ana
San Diego	Conventional Rail	Extension of Double-Track at San Onofre
San Diego	Conventional Rail	Extension of Double-Track in Oceanside
San Diego	Conventional Rail	Sorrento-Miramar Double-Tracking and Curve Realignment
San Diego	Conventional Rail	O'Neil to Flores Double-Tracking
San Diego	Conventional Rail	Santa Margarita River Bridge Replacement and Double-Tracking
San Diego	Conventional Rail	Fallbrook Junction Track Upgrades
San Diego	Conventional Rail	Del Mar Bluffs Stabilization
San Diego	Conventional Rail	False Bay Passing Track
San Diego	Conventional Rail	Tecolote Creek Track Improvements and Bridge Replacement

Source: Parsons Brinckerhoff, California High-Speed Train Program Environmental Impact Report/Environmental Impact Statement, *System Alternatives Definition,* November 18, 2002

1.1.2 Modal Alternative

There are currently only three main options for intercity travel between the major urban areas of San Diego, Los Angeles, the Central Valley, San Jose, Oakland/San Francisco, and Sacramento: vehicles on the interstate highway system and state highways, commercial airlines serving airports between San Diego and Sacramento and the Bay Area, and conventional passenger trains (Amtrak) on freight and/or commuter rail tracks. The Modal/System Alternative consists of expansion of highways, airports, and intercity and commuter rail systems serving the markets identified for the High-Speed Train Alternative (Figures 1-2 and 1-3). The Modal Alternative uses the same inter-city travel demand (not capacity) assumed under the high-end sensitivity analysis completed for the high-speed train ridership in 2020. This same travel demand is assigned to the highways and airports and passenger rail described under the No-Project Alternative, and the additional improvements or expansion of facilities is assumed to meet the demand, regardless of funding potential and without high-speed train service as part of the system.

The Modal Alternative for the Los Angeles-Orange County-San Diego Region is defined as further expansion of Interstate 5 (beyond the expansion planned under the No-Project Alternative), as well as expansion at the Long Beach Airport. Table 1-2 summarizes the highway expansion components of the Modal Alternative for this Region.

TABLE 1-2

Modal Alternative: Highway Capacity Improvement Options for Year 2020
Los Angeles – Orange County – San Diego Region
(2020 Intercity Travel Demand with Highway Expansion only)

Highway Corridor	Segment (To-From)	No. of Additional Lanes[1] (Total – Both Directions)
I-5	L.A. Union Station to I-10	4
I-5	I-10 to Norwalk	2
I-5	Norwalk to Anaheim	2
I-5	Anaheim to Irvine	2
I-5	Irvine to I-405	2
I-5	I-405 to SR-78	2
I-5	SR-78 to University Town Center	2
I-5	University Town Center to San Diego Airport	2

Source: Parsons Brinckerhoff, California High-Speed Train Program Environmental Impact Report/ Environmental Impact Statement, *System Alternatives Definition,* November 18, 2002

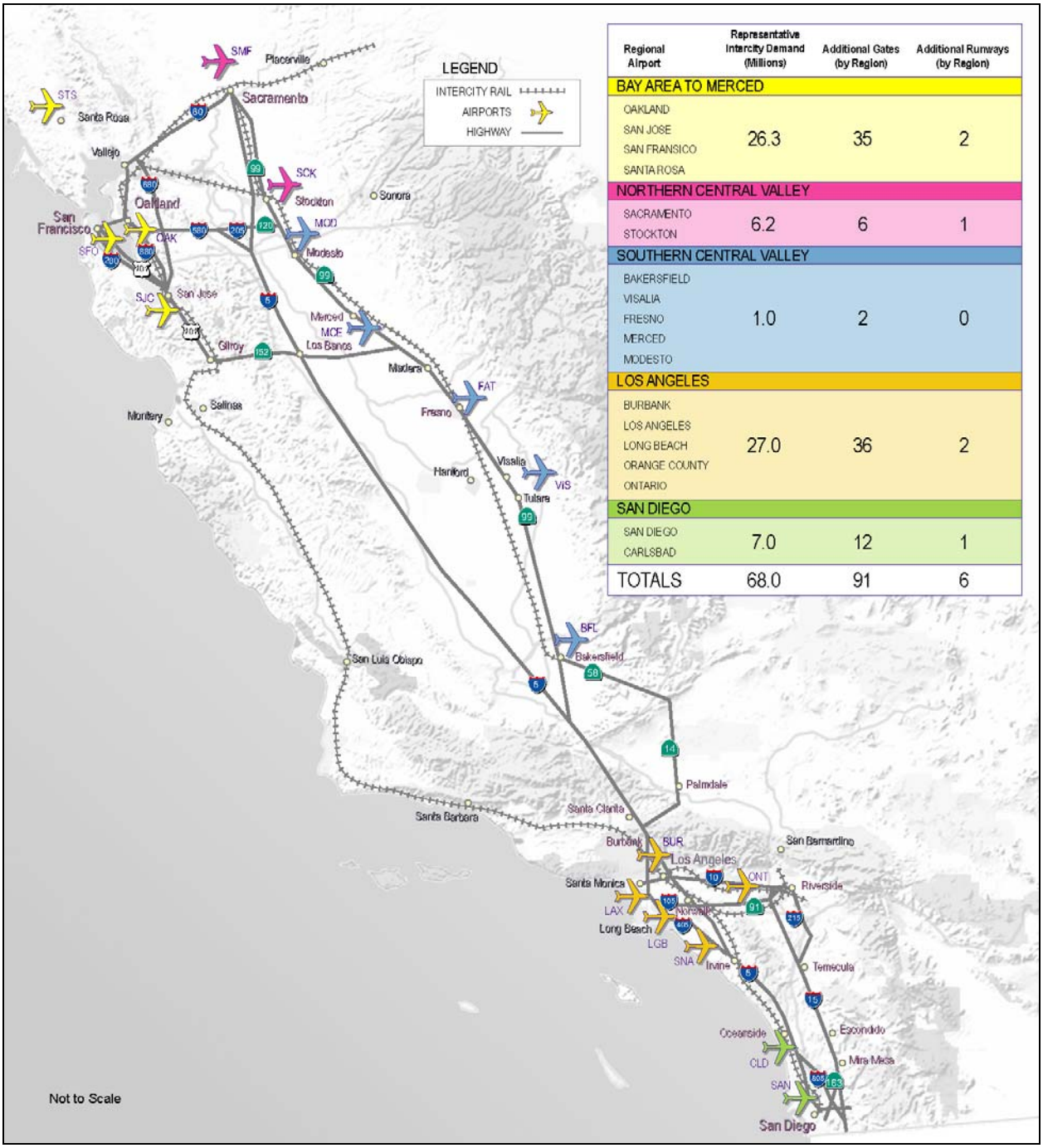
1. Represents the number of through lanes, in addition to the total number of lanes in the No-Project Highway Network, that approximate an equivalent level of capacity to serve the representative demand.

FIGURE 1-2

Modal Alternative – Highway Component

FIGURE 1-3

Modal Alternative – Aviation Component



Regional Airport	Representative Intercity Demand (Millions)	Additional Gates (by Region)	Additional Runways (by Region)
BAY AREA TO MERCED			
OAKLAND SAN JOSE SAN FRANSICO SANTA ROSA	26.3	35	2
NORTHERN CENTRAL VALLEY			
SACRAMENTO STOCKTON	6.2	6	1
SOUTHERN CENTRAL VALLEY			
BAKERSFIELD VISALIA FRESNO MERCED MODESTO	1.0	2	0
LOS ANGELES			
BURBANK LOS ANGELES LONG BEACH ORANGE COUNTY ONTARIO	27.0	36	2
SAN DIEGO			
SAN DIEGO CARLSBAD	7.0	12	1
TOTALS	68.0	91	6

1.1.3 High-Speed Train Alternative

The Authority has defined a statewide high-speed train system capable of speeds in excess of 200 miles per hour (mph) (320 kilometers per hour [km/h]) on dedicated, fully grade-separated tracks, with state-of-the-art safety, signaling, and automated train control systems. State of the art high-speed steel-wheel-on-steel-rail technology is being considered for the system that would serve the major metropolitan centers of California, extending from Sacramento and the San Francisco Bay Area, through the Central Valley, to Los Angeles and San Diego (Figure 1-4).

The High-Speed Train (HST) Alternative includes several corridor and station options. A steel-wheel on steel-rail, electrified train, primarily on exclusive right-of-way with small portions of the route on shared track with other rail is planned. Conventional "non-electric" improvements are also being considered along the existing LOSSAN rail corridor from Los Angeles to San Diego. The train track would be either at-grade, in an open trench or tunnel, or on an elevated guideway, depending on terrain and physical constraints.

In the Los Angeles-Orange County-San Diego Region, the HST Alternative consists of electrified rail options north of Irvine (described in this report as High-Speed Rail or HSR), and improvements and options for the existing LOSSAN rail corridor between Los Angeles and San Diego (described in this report as Conventional Rail).

For purposes of comparative analysis the HST corridors will be described from station-to-station within each region, except where a by-pass option is considered when the point of departure from the corridor will define the end of the corridor segment. Table 1-3 summarizes the segments, improvements, and alignment and station options evaluated for the Los Angeles-Orange County-San Diego Region. The alignment segments are shown (north to south) in Figures 1-5A, B and C. These figures also show the proposed construction type for each alignment option (open trench, covered trench, tunnel, at-grade, or elevated), and where the alignment options would be located outside of an existing rail corridor.

LOSSAN Corridor Screening Process

A strategic planning process was undertaken as part of the evaluation of Conventional Rail improvements in the LOSSAN Corridor. This process was used to gain additional public input on the various rail improvement options being considered, and to reduce the number of alternatives to those that most reasonably and feasibly can meet the objectives, purpose, and need for the project. There are four locations within the LOSSAN Corridor where the initial range of alternatives was sufficiently broad to allow for the screening, or narrowing, of the alternatives to be carried forward in the Program EIR/EIS: San Juan Capistrano, Dana Point/San Clemente, Encinitas, and Del Mar.

Based on public and agency input, and technical, environmental and economic evaluations, a number of alternatives described in this technical report were subsequently eliminated from further consideration. The alternatives eliminated are shown in Table 1-3 in italics and gray shading. The environmental evaluation of these alternatives is included in this technical report, and was considered in the screening process. More detail on the screening process for the LOSSAN Corridor can be found in the final *Los Angeles to San Diego via Orange County Conventional Improvements Screening Repo*rt (Authority, 2003).

FIGURE 1-4

High-Speed Train Alternative – Corridors and Stations for Continued Investigation

TABLE 1-3

Alignment and Station Options for High-Speed Train Alternative
Los Angeles – Orange County – San Diego Region

Alignment Segments and Station Locations Evaluated[1]	Description of Proposed Options & Improvements
HIGH-SPEED RAIL (HSR) & STATION OPTIONS	
LAX To Union Station	Construction of an electrified, grade-separated, dedicated track within an existing rail corridor. The train would be on an elevated structure from Union Station to Alameda Street, then transition into a trench that ends at LAX.
Stations	
LAX	New underground station.
Union Station To Anaheim Station via UPRR	Construction of an electrified, grade-separated, dedicated track within an existing rail corridor. Train would be on an elevated structure from Union Station, go into a trench at Slauson Avenue, move to at-grade across San Gabriel River, return to a trench up to La Canada Verde Creek, then become an aerial structure to Edison Field where it would go underground to a depressed station.
Stations	
Norwalk	New elevated station.
Anaheim	New underground station, built beneath existing station.
Union Station To Irvine Station via LOSSAN	Construction of fully grade-separated tracks within existing rail corridor, to be shared by electrified and conventional trains.
Stations	
Norwalk	Existing station. Proposed improvements include bypass tracks and additional parking.
Fullerton	Existing station. Proposed improvements include bypass tracks and additional parking.
Anaheim	Existing station. Proposed improvements include bypass tracks and additional parking.
Santa Ana	Existing station. Proposed improvements include bypass tracks and additional parking.
Irvine	Existing station. Expanded platform and parking, "terminal" tracks.
CONVENTIONAL RAIL (LOSSAN CORRIDOR) & STATION OPTIONS	
Union Station To Fullerton Station 4th Main Track	Construction of fourth main track in existing rail corridor between Commerce and Fullerton. Improvements can probably be accommodated within existing LOSSAN ROW except between Rio Hondo River and San Gabriel River.
Fullerton Station To Irvine Station	
Alignment Options:	
AT-GRADE between Walnut Ave (Orange) and E. 17th St. (Santa Ana)	Grade separations at street intersections between Walnut Ave. (in Orange) and E. 17th Street in Santa Ana. At-grade curve straightening between Batavia Street and Walnut Ave. Improvements would be in existing rail corridor ROW, except for the curve realignment.
TRENCH between Walnut Ave (Orange) and E. 17th St. (Santa Ana)	Fully grade-separate existing rail corridor in a covered trench (same alignment as above), including curve straightening.
Stations	
Fullerton	Existing station. Proposed improvements include bypass tracks, platform reconfiguration, and additional parking.
Anaheim	Existing station. Proposed improvements include bypass tracks and additional parking.
Santa Ana	Existing station. Proposed improvements include bypass tracks and additional parking.
Irvine	Existing station. Proposed improvements include bypass tracks and additional parking.

[1] Conventional Rail (LOSSAN Corridor) alignment and/or construction options shown in italics and gray shading were eliminated from further evaluation during the LOSSAN Corridor Strategic Plan screening process. See text for more detail.

TABLE 1-3

Alignment and Station Options for High-Speed Train Alternative
Los Angeles – Orange County – San Diego Region (continued)

Alignment Segments and Station Locations Evaluated[1]	Description of Proposed Options & Improvements
Irvine Station To San Juan Capistrano City Limits (no improvements)	No improvements are proposed for this conventional rail segment under the High-Speed Train Alternative.
San Juan Capistrano (City Limits to Avenida Aeropuerto)	
Alignments	
Covered TRENCH/Cut-Fill between Trabuco Creek and Avenida Aeropuerto (trench goes under San Juan Creek); Double tracking	*Double-tracking via an open trench along the approach to and departure from the San Juan Capistrano Station (relocated from the existing track location on the west side of the station to the east side of the station), and a covered trench under the parking area at the station. This option would include curve realignment at San Juan Creek*
TUNNEL along I-5 between Hwy 73 and Avenida Aeropuerto (tunnel under Trabuco Creek and San Juan Creek); Double tracking	Double-tracking in a tunnel running the length of the City of San Juan Capistrano under Interstate 5.
AT-GRADE and Open TRENCH along east side of Trabuco Creek	Double-tracking at grade and in an open trench along the east side of Trabuco Creek, west of the existing rail alignment.
Stations	
San Juan Capistrano	Existing station (for Covered Trench alignment only): Proposed improvements include double tracking (by-pass tracks) and parking expansion. New station would be constructed with the At-Grade/Open Trench option along Trabuco Creek. New station would be below-grade in open trench. No station would be included in San Juan Capistrano for the I-5 tunnel option.
Dana Point/San Clemente (Avenida Aeropuerto To San Onofre Power Plant)	
Alignments	
Dana Point Curve Realignment; San Clemente - SHORT TRENCH; Double Tracking	*Double-tracking and straightening existing curve at Dana Point between San Juan Creek and Avenida Aeropuerto along the existing rail corridor; double-tracking in existing rail alignment in San Clemente in a covered trench for about 1,000 feet either side of the pier.*
Dana Point Curve Realignment; San Clemente - LONG TRENCH; Double Tracking	*Double-tracking and straightening existing curve at Dana Point between San Juan Creek and Avenida Aeropuerto along the existing rail corridor; double-tracking generally along existing rail corridor through San Clemente in a covered trench from about one mile north of San Mateo Creek to about 4,000 feet north of the pier. This trench option includes one section that leaves the existing corridor and goes underneath residences located west of the corridor between the municipal pier and North El Camino Real.*
Dana Point Curve Realignment; San Clemente - SHORT TUNNEL; Double Tracking	Double-tracking and straightening existing curve at Dana Point in existing rail corridor; double-tracking via a short tunnel that follows Interstate 5 between Palm Drive and San Onofre State Beach, north of the power plant. The short tunnel alignment leaves the Interstate 5 corridor at Avenida Palizada, turns toward the coast and runs underneath residential, industrial and vacant areas, connecting with the existing rail corridor just south of Camino Capistrano.

[1] Conventional Rail (LOSSAN Corridor) alignment and/or construction options shown in italics and gray shading were eliminated from further evaluation during the LOSSAN Corridor Strategic Plan screening process. See text for more detail.

TABLE 1-3

Alignment and Station Options for High-Speed Train Alternative Los Angeles – Orange County – San Diego Region (continued)

Alignment Segments and Station Locations Evaluated[1]	Description of Proposed Options & Improvements
San Clemente - LONG ONE-SEGMENT TUNNEL ; Double Tracking (crosses San Mateo and San Onofre Creeks)	*Double-tracking via a long, one- segment tunnel following Interstate 5 from San Onofre State Beach to Avenida Aeropuerto in San Juan Capistrano. This option precludes the need for curve realignment at Dana Point. The existing rail corridor along the coast between southern San Clemente city limits to approximately Avenida Aeropuerto in San Juan Capistrano would be removed from service (or at least not be further improved from its existing condition).*
San Clemente - LONG TWO-SEGMENT TUNNEL; Double Tracking (crosses San Mateo and San Onofre Creeks)	Double-tracking via a long, two- segment tunnel following Interstate 5 from San Onofre State Beach to Avenida Aeropuerto in San Juan Capistrano. This option precludes the need for curve realignment at Dana Point. This tunnel would have the same alignment as the one-segment long tunnel above except in a one-mile stretch near Avenida Pico, it would veer to the east edge of I-5 and daylight into an open trench for about 1,000 feet. The existing rail corridor along the coast between southern San Clemente city limits to approximately Avenida Aeropuerto in San Juan Capistrano would be removed from service (or at least not be further improved from its existing condition).
Stations	
San Clemente	The trench options for this segment would include a proposed below-grade station south of the municipal pier to replace the existing San Clemente Station. The tunnel options would eliminate the need for a train station downtown; a new below-grade station would be constructed along the tunnel alignment where the tunnel transitions to a trench.
Camp Pendleton (San Onofre Power Plant to Oceanside City Limits - Double tracking; crosses San Mateo, San Onofre, and Santa Margarita Creeks)	Construction of an at-grade second main track, in portions of this segment covering about six miles, that are not already double-tracked or will be under the conventional rail improvements included in the No Build Alternative.
Oceanside/Carlsbad (Oceanside City Limits to Encinitas City Limits)	
Alignments	
Carlsbad - AT-GRADE; double tracking; crosses San Luis Rey, Buena Vista , Aqua Hedionda, and Batiquitos Lagoons	Double-tracking through Carlsbad in existing rail alignment at grade.
Carlsbad -TRENCH; double-tracking; crosses San Luis Rey, Buena Vista, Aqua Hedionda, and Batiquitos Lagoons	Double-tracking through Carlsbad in existing rail alignment in trench.
Stations	
Oceanside	Existing station. Proposed improvements include bypass tracks and parking expansion.

[1] Conventional Rail (LOSSAN Corridor) alignment and/or construction options shown in italics and gray shading were eliminated from further evaluation during the LOSSAN Corridor Strategic Plan screening process. See text for more detail.

TABLE 1-3

Alignment and Station Options for High-Speed Train Alternative Los Angeles – Orange County – San Diego Region (continued)

Alignment Segments and Station Locations Evaluated[1]	Description of Proposed Options & Improvements
Encinitas/Solana Beach (Encinitas City Limits to Solana Beach Station)	
Alignments	
Encinitas - AT-GRADE; Double Tracking; crosses San Elijo Lagoon	Double-tracking primarily at-grade, with a short trench segment for the rail corridor on either side of Birmingham Drive. This option would include reconfiguring the street intersection at Birmingham Drive and San Elijo Avenue, and close Chesterfield Drive at San Elijo Avenue. Another grade separation would occur at Leucadia Boulevard where the tracks would be depressed. Pedestrian undercrossings would be placed along the route.
Encinitas - SHORT TRENCH; Double Tracking; crosses San Elijo Lagoon	Double-tracking in same alignment as at-grade option above, but with an additional covered trench under Encinitas Boulevard and a transitional open trench about 1,500 feet either side of Encinitas Boulevard.
Encinitas - LONG TRENCH; Double Tracking; crosses San Elijo Lagoon	*Double-tracking in same alignment as options described above. Tracks would be in an open trench south of the Batiquitos Lagoon, then drop into a covered trench as they approach the downtown area, then return to an open trench up to the north end of the San Elijo Lagoon, where they transition to at-grade. Chesterfield Drive at San Elijo Avenue would be closed. Pedestrian crossings would be placed along the route.*
Stations	
Solana Beach	Existing station. Proposed improvements include platform modifications and parking expansion.
Del Mar(Solana Beach Station to I-5/805 Split)	
Alignments	
COVERED TRENCH on bluffs; crosses San Dieguito and Los Penasquitos Lagoons	*Double-tracking in a covered trench in the existing rail corridor alignment along the bluffs.*
TUNNEL under Camino Del Mar; crosses San Dieguito and Los Penasquitos Lagoons	Double-tracking via a tunnel underneath Camino Del Mar. Tunnel would begin at Jimmy Durante Boulevard, and daylight at Carmel Valley Road where tracks would then connect with the existing alignment across Los Penasquitos Lagoon. The existing rail track on the bluffs would be removed from service.
TUNNEL along I-5; crosses San Dieguito and Los Penasquitos Lagoons	Double-tracking via a tunnel that would run under Interstate 5 and daylight along the southern boundary of San Dieguito Lagoon. Tracks would reconnect with the existing rail at-grade near the Del Mar race track. The existing rail track on the bluffs would be removed from service.
I-5/805 Split To Hwy 52	
Alignments	
Miramar Hill Tunnel	Double-tracking via a tunnel through Miramar Hill.
I-5 Tunnel	Double-tracking via a tunnel under Interstate 5.
Stations	
UTC (Only applies to Miramar Hill Tunnel)	New station, proposed only with the Miramar Hill tunnel option. Station would be constructed underground.
Hwy 52 To Santa Fe Depot (Curve realignment; Double Tracking; San Diego River Bridge; Trench between Sassafras St and Cedar St)	Double-tracking in existing rail corridor for full length of segment. An existing curve just south of Highway 52 would be straightened, requiring two new bridges over wetlands in San Clemente Canyon. New bridges would also be constructed over Tecolote Creek and San Diego River. Tracks would be placed in a trench between Sassafras Street and Cedar Street.
Stations	
Santa Fe Depot	Existing station. Proposed improvements include bypass tracks and parking expansion.

[1] Conventional Rail (LOSSAN Corridor) alignment and/or construction options shown in italics and gray shading were eliminated from further evaluation during the LOSSAN Corridor Strategic Plan screening process. See text for more detail.

FIGURE 1-5A

High-Speed Train Alternative: Alignment and Construction Type by Segment (Los Angeles to Irvine)

FIGURE 1-5B

High-Speed Train Alternative: Alignment and Construction Type by Segment (Irvine to Oceanside)

FIGURE 1-5C

High-Speed Train Alternative: Alignment and Construction Type by Segment (Oceanside to San Diego)

2.0 BASELINE/AFFECTED ENVIRONMENT

2.1 STUDY AREA

The Study Area for public utilities is defined as 100 feet on either side of the corridor centerline and around stations, resulting in a 200-foot-wide study area that incorporates all cross sections with the possible exception of deep cuts and fills. The utilities described in this screening document represent an initial inventory of select utilities identified in prepared databases and readily available documents only; this study is not intended to fully identify the public utility infrastructure potentially affected by the alternatives. Public utilities described in this report include electrical facilities (substations and transmission lines of 230 kV and above), high-pressure natural gas lines, and wastewater treatment plants (including major trunk lines and ocean outfalls). Comparisons of alternative alignments were generally made for this screening level document based on the number of locations where a particular utility crosses a corridor being evaluated.

2.2 REGULATORY SETTING

2.2.1 California Public Utilities Commission

Utilities within California are primarily regulated by the California Public Utilities Commission (CPUC), which regulates privately owned telecommunications, electric, natural gas, water, railroad, rail transit, and passenger transportation companies. The CPUC is responsible for assuring that California utility customers have safe, reliable, utility services at reasonable rates, protecting utility customers from fraud, and promoting the health of California's economy. The CPUC does not issue permits for utility line crossings. The CPUC does, however, regulate at-grade rail crossings. Thus, any at-grade rail crossing for the HST Alternative will require CPUC approval (CPUC, 2003a and 2003c).

Regarding electricity, Assembly Bill (AB) 970 requires the CPUC to identify constraints in California's transmission and distribution system and to take actions to remove them. In 2001, the CPUC prepared a report that identified 51 constraints on California's transmission and distribution systems that would exist by summer 2001. This report also identified an additional 107 constraints that would affect the system's reliability from 2002 to 2005. The report recommended that utilities complete various projects to increase system capacity to allow more energy to flow to consumers, improve system reliability by making the system more stable, and/or allow access to a wider range of generation sources, some of which may supply cheaper power (CPUC, 2001a). Since these projects have not yet been defined, future HST conflicts could occur that are not noted in this report.

Regarding natural gas facilities, the CPUC regulates the rates and services of California's natural gas utilities, including backbone gas transmission systems, local gas transmission, storage, gas distribution, and gas procurement (CPUC, 2001b). The CPUC does not issue permits for utility crossings.

2.2.2 California Energy Commission

The California Energy Commission (CEC) is the state's primary energy policy and planning agency. Created by the Legislature in 1974 and located in Sacramento, the Commission's five major responsibilities are listed below (CEC, 2003a):

- Forecasting future energy needs and keeping historical energy data
- Licensing thermal power plants of 50 megawatts or larger
- Promoting energy efficiency through appliance and building standards

- Developing energy technologies and supporting renewable energy
- Planning for and directing state response to energy emergency

The CEC does not directly permit utility conflicts; rather the utility companies must comply with CEQA as part of any utility line relocation efforts undertaken resulting from implementation of HST Alternatives. In addition, the utility companies would have to obtain local jurisdiction permits if easements are required as part of utility line relocations (CEC, 2003b).

2.2.3 Federal Energy Regulatory Commission

In addition to the CPUC and CEC, the Federal Energy Regulatory Commission (FERC) approves rates for wholesale electric sales of electricity and transmission in interstate commerce for private utilities, power marketers, power pools, power exchanges, and independent system operators. FERC acts under the legal authority of the Federal Power Act of 1935, the Public Utility Regulatory Policies Act, and the Energy Policy Act (FERC, 2003a). FERC also administers the Natural Gas Act (NGA) of 1938, the Natural Gas Policy Act of 1978, the Outer Continental Shelf Lands Act of 1953, the Natural Gas Wellhead Decontrol Act of 1989, and the Energy Policy Act of 1992. These are the primary laws that FERC administers to oversee America's natural gas pipeline industry. Under the NGA, FERC regulates both the construction of pipeline facilities and the transportation of natural gas in interstate commerce. Companies providing services and constructing and operating interstate pipelines must first obtain certificates of public convenience and necessity from FERC. If a project alternative requires the relocation of a certificated interstate pipeline, the utility company will have to obtain approval from FERC for the relocation. If the relocation also requires new easements, local approval will be required (FERC, 2003c).

2.2.4 Office of the State Fire Marshall

The Office of the State Fire Marshal (OSFM), Pipeline Safety Division, regulates the safety of approximately 5,500 miles of intrastate hazardous liquid transportation pipelines and acts as an agent of the Federal Office of Pipeline Safety concerning the inspection of more than 2,000 miles of interstate pipelines. Pipeline Safety staff inspect, test, and investigate to ensure compliance with all federal and state pipeline safety laws and regulations. All spills, ruptures, fires, or similar incidents are responded to immediately; all such accidents are investigated for cause. Under existing law, the Elder California Pipeline Safety Act of 1981, the State Fire Marshal administers provisions regulating the inspection of intrastate pipelines that transport hazardous liquids. Other regulations the State Fire Marshal implements include the Hazardous Liquids Pipeline Safety Act, Code of Federal Regulations (CFR) Title 49 Part 186-199, AB 592, and Section 51010 of the California Government Code. If a project alternative requires the relocation of a hazardous liquid pipeline, the State Fire Marshal will have to inspect and test the relocated pipeline. If the relocation also requires new easements, local approval will be required (OSFM, 2003a).

2.2.5 Wastewater Regulatory Setting

Numerous regulatory agencies are involved in wastewater treatment oversight. These agencies include the U.S. Environmental Protection Agency (EPA), the California Water Resources Control Board, and Regional Water Quality Control Boards (RWQCB). Primary wastewater regulation occurs via water quality discharge standards that are implemented through National Pollutant Discharge Elimination System (NPDES) permits issued by the various RWQCBs. Wastewater conveyance and treatment facilities in the study area are owned and/or operated by different agencies and jurisdictions. Any potential conflict with such facility would be coordinated with the respective agency. If the project alternatives encroach on wastewater facility easements, permits from the agency and/or local jurisdiction would be anticipated.

2.3 STUDY AREA SETTING

Table 2-1 shows the preliminary estimate of the utility service types and providers, for the utilities identified in this analysis, potentially affected by construction of the Modal and High-Speed Train alternatives.

TABLE 2-1

Utility Types and Service Providers
Los Angeles – Orange County – San Diego Region

Utility Type	Service Provider
Electricity	Southern California Edison Los Angeles Department of Water & Power SEMPRA (San Diego Gas & Electric)
Natural Gas	Southern California Gas Company
Waste Water Treatment Facilities and Ocean Outfalls	San Diego Metropolitan Wastewater Dept. Encina Wastewater Authority San Elijo Joint Powers Authority South Orange County Wastewater Authority

2.3.1 Electricity

2.3.1.1 Service Providers

The primary electrical service providers in the project area include Southern California Edison (SCE), Los Angeles Department of Water & Power (LADWP), and SEMPRA/San Diego Gas & Electric (SDG&E).

2.3.1.2 Substations and Major Transmission Lines

Substations

Four electrical substations are located within the 200-foot study area of the High-Speed Train Alternative. Three of these active substations are owned and operated by SCE and are located in the following segments:

- Union Station to Anaheim Station via UPRR (1)
- Union Station to Irvine Station via LOSSAN Corridor (1)
- Fullerton Station to Irvine Station (1)

SDG&E operates the fourth electrical substation which is located within the corridor buffer zone near the Santa Fe Depot in San Diego.

No electrical substations were identified within the 200-foot study area of Modal Alternative.

Transmission Lines

Sixty-two 230 kV transmission lines are located within the 200-foot study area of the High-Speed Train Alternative (Figure 2-1). These existing, overhead transmission lines are individually owned and operated by one of the three electrical service providers identified above. These transmission lines are located in the following route segments:

- LAX to Union Station (6)
- Union Station to Irvine Station via LOSSAN Corridor (19)
- Union Station to Fullerton Station (15)
- Union Station to Anaheim Station via UPRR (16)
- Fullerton Station to Irvine Station (4)
- Oceanside/Carlsbad (2)

No 230 kV and above transmission lines were identified within the study areas of existing or proposed rail stations in High-Speed Train Alternative.

Twenty-six 230 kV transmission lines were identified within the 200-foot study area of the Modal Alternative (Figure 2-1). These existing, overhead transmission lines are individually owned and operated by one of the three electrical service providers previously identified, and are located in the following route segments:

- Union Station to Fullerton Station (12)
- Fullerton Station to Irvine Station (2)
- Dana Point/San Clemente (9)
- Oceanside/Carlsbad (3)
- The transmission line data shown on Figure 2-1 is a graphic representation of utility density, and does not show every individual transmission line. For example, a line on the map may represent a corridor in which multiple transmission lines are located.

2.3.2 High Pressure Natural Gas

2.3.2.1 Service Providers

Southern California Gas Company (SoCalGas) is the principal distributor of natural gas in southern California, providing retail and wholesale customers with procurement, transportation, exchange and storage services. SoCalGas is a gas-only utility and, in addition to serving the residential, commercial, and industrial markets, provides gas for enhanced oil recovery and electrical generation in southern California. San Diego Gas & Electric, Southwest Gas Corporation, and the City of Long Beach Energy Department are SoCalGas' three wholesale utility customers (SoCalGas 2002).

2.3.2.2 High Pressure Natural Gas Major Facilities and Distribution Lines

SoCalGas supplies natural gas to the project area through a system of subsurface gas mains and pipelines. One hundred forty-three natural gas lines, ranging from 3 inches to 36 inches in diameter, were identified within the 200-foot study area of the High-Speed Train Alternative (Figure 2-1). These natural gas lines are located in the following route segments:

FIGURE 2-1

Major Utilities

Source : EIAGIS, 2001

FIGURE 2-1

LAX to Union Station (41)

- Union Station to Anaheim Station via UPRR (28)
- Union Station to Irvine Station via LOSSAN Corridor (30)
- Union Station to Fullerton Station (24)
- Fullerton Station to Irvine Station (6)
- Dana Point/San Clemente (1) for each of the two general alignment options
- I-5 Split to Highway 52 (9) for each of the two alignment options

In addition, natural gas lines were identified within the study area at LAX Station (3), Norwalk Station on the LOSSAN corridor (1), Norwalk Station on the UPRR Corridor (2), and at the Santa Ana Regional Transportation Center (2).

Forty-five natural gas lines, ranging from 4 inches to 36 inches in diameter, were identified within the 200-foot study area of the Modal Alternative (Figure 2-1). These natural gas lines are located in the following segments:

- Union Station to Fullerton Station (16)
- Fullerton Station to Irvine Station (14)
- San Juan Capistrano (1)
- Dana Point/San Clemente (1) for each of the two general alignment options
- Oceanside/Carlsbad (7)
- Encinitas/Solana Beach (1)
- I-5/805 Split to Highway 52 (2)
- Highway 52 to Santa Fe Depot (3)

2.3.3 Waste Water Treatment Plants

2.3.3.1 Service Providers

Wastewater treatment services evaluated in this study are provided by San Diego Metropolitan Wastewater Department, Encina Wastewater Authority, San Elijo Joint Powers Authority, United States Marine Corps - Camp Pendleton, and South Orange County Wastewater Authority. Because there were no wastewater treatment plants identified within the study area, a detailed listing of service providers was not compiled.

2.3.3.2 Wastewater Treatment Facilities

Primary wastewater treatment facilities identified within the 200-foot study area of the High-Speed Train Alternative include five treated wastewater ocean outfalls and two (2) major sewer trunk lines (Figure 2-1). Ocean outfalls are located in the following segments:

- Dana Point/San Clemente (1)
- Camp Pendleton (2)
- Oceanside/Carlsbad (1)
- Encinitas/Solana Beach (1)

Primary wastewater treatment facilities identified within the 200-foot study area of the Modal Alternative include two treated wastewater ocean outfalls in the Camp Pendleton segment, one major sewer trunk line in the I-5/805 to Highway 52 segment, and one major sewer trunk line in the Highway 52 to Santa Fe Depot segment.

3.0 EVALUATION METHODOLOGY FOR PUBLIC UTILITIES

Potential impacts on public utilities were evaluated based on a comparison of known utility locations versus project facility location for the build alternatives. For the purposes of analyzing potential impacts to public utilities the following infrastructure was identified as the primary candidates for impact:

Electrical facilities

- Substations
- Transmission lines (230kV and above)

Natural gas lines (high pressure)

- Major facilities and distribution lines

Waste water treatment facilities (including major trunk lines and treated wastewater ocean outfalls)

Electrical and natural gas utilities potentially impacted by construction of the build alternatives were identified from a published utility database produced by MAPSearch (Pennwell MAPSearch 2003). This database includes information addressing utility type, owner, operator, location, capacity, commodities transported, and system metrics. Because the MAPSearch data was available in Geographic Information System (GIS) format, the two build alternative corridors were digitized in GIS format and overlain on the utility file to determine locations where project corridors are crossed by existing electrical and natural gas infrastructure. Wastewater treatment facilities were identified through information from and personal communications with the San Diego and Santa Ana Regional Water Quality Control Boards, the South Orange County Wastewater Authority, and California Environmental Protection Agency website. Identified wastewater treatment facilities were then mapped relative to the project corridors to determine where potential impacts would occur. Existing utility information was screened for infrastructure occurring within a 200-foot wide (100 feet on either side of centerline) corridor and 100 feet around stations.

Each project alternative was divided into segments and evaluated for the number of times a project corridor is crossed by electrical, natural gas, and wastewater utilities. Each crossing was assigned an impact level ranking of high, moderate, or low. These rankings are based on the assumptions that higher voltage transmission lines, greater number of natural gas lines, and large-diameter wastewater trunk lines and ocean outfalls are costlier and more difficult to relocate and have a greater potential for consumer impact in the event of service disruption (Table 3-1). All wastewater treatment facilities identified in this evaluation (treated wastewater ocean outfalls and major sewer trunk lines) were considered to have high potential relocation impacts due to their large diameter, high construction cost and time, and potential for service interruption.

The limitation of this program-level document is that only major utilities have been identified. A comprehensive field and records search would be necessary in later project stages to identify all potentially affected utilities (i.e., electrical transmission lines less than 230 kV, water distribution lines, minor gas lines, sewer lines, irrigation canals, and telephone and fiber optic lines).

TABLE 3-1
Base Impact Level Designations

Impact Level	Electrical Facilities	Natural Gas Lines	Waste Treatment Facilities
Low	No 230 kV or greater facility within the study area	1 to 15 gas lines within study area	No wastewater pipelines of 36 inch diameter or treatment facilities are in the study area
Medium	None*	16 to 30 gas lines within study area	None*
High	One or more 230 kV or greater facility within the study area	31 or more gas lines within study area	Wastewater pipelines of 36 inch diameter or greater or treatment facilities are in the study area

*There is no Medium rating for this category; impacts are either Low (no facilities in the segment) or High (one facility or more in the segment).

4.0 PUBLIC UTILITY IMPACTS

The major impacts associated with public utilities are cost of relocation, disruption of service during construction, and/or exclusion of the utility from the corridor following construction. Because construction of the build alternatives has the potential to conflict with existing public utilities, this section focuses on the impacts that construction would have on select utilities along the corridors and around stations. Impacts would range from situations where utilities would need minor rerouting, to avoid a High-Speed Train or Modal system component, to major relocations. Minor relocations would likely be required when the corridor intersects a utility route at right angles. Major relocations would likely be required where the corridor conflicts with a utility in several or continuous locations, or where the corridor runs parallel to and on top of a utility route.

The primary utilities potentially affected are electrical facilities (substations and major transmission lines of 230 kV and above), high-pressure natural gas pipelines, and waste water treatment facilities (major trunk lines and treated wastewater ocean outfalls). The Detailed Analysis/Comparison Table (Table 4-1) indicates, by alternative and route segment, the number of times a project corridor is crossed by electrical, natural gas, and wastewater utilities, and ranks the relocation impact as high, moderate, or low.

TABLE 4-1

Detailed Analysis/Comparison Table
Utilities Impacts
Los Angeles – Orange County – San Diego

	Electrical Facilities SS = Substation TL = Transmission Line (H or L)	Natural Gas Lines (H,M,L)	Waste Treatment Facilities (H or L)
NO-PROJECT	See Text in Section 4.1		
MODAL			
Union Station to LAX	N/A	N/A	N/A
Union Station To Fullerton Station	H (12 TL)	M (16)	L (none)
Fullerton Station To Irvine Station	H (2 TL)	L (14)	L (none)
Irvine Station To San Juan Capistrano City Limits	L (none)	--	L (none)
San Juan Capistrano	L (none)	L (1)	L (none)
Dana Point/San Clemente	H (9 TL)	L (1)	L (none)
Camp Pendleton	L (none)	--	H (2)
Oceanside/Carlsbad	H (3 TL)	L (7)	L (none)
Encinitas/Solana Beach	L (none)	L (1)	L (none)
Del Mar	L (none)	--	L (none)
I-5/805 Split To Hwy 52	L (none)	L (2)	H (1)
Hwy 52 To Santa Fe Depot	L (none)	L (3)	H (1)
Long Beach Airport	L (none)	--	L (none)
HST CORRIDORS & STATION OPTIONS			
LAX To Union Station	H (6 TL)	H (41)	L (none)
Stations			
LAX	L (none)	L (3)	L (none)
Union Station To Anaheim Station via UPRR	H (1 SS; 16TL)	M (28)	L (none)
Stations			
Norwalk	L (none)	L (2)	L (none)
Anaheim	L (none)	--	L (none)

TABLE 4-1

Detailed Analysis/Comparison Table
Utilities Impacts
Los Angeles – Orange County – San Diego (continued)

	Electrical Facilities SS = Substation TL = Transmission Line (H or L)	Natural Gas Lines (H,M,L)	Waste Treatment Facilities (H or L)
Union Station To Irvine Station via LOSSAN	H (1 SS; 19 TL)	M (30)	L (none)
Stations			
Norwalk	L (none)	L (1)	L (none)
Fullerton	L (none)	--	L (none)
Anaheim	L (none)	--	L (none)
Santa Ana	L (none)	L (2)	L (none)
Irvine	L (none)	--	L (none)
CONVENTIONAL RAIL (LOSSAN) & STATION OPTIONS			
Union Station To Fullerton Station (4th main track)	H (15 TL)	M (24)	L (none)
Fullerton Station To Irvine Station			
Alignments			
AT-GRADE between Walnut Ave (Orange) and E. 17th St. (Santa Ana)	H (1 SS; 4 TL)	L (6)	L (none)
TRENCH between Walnut Ave (Orange) and E. 17th St. (Santa Ana)	H (1 SS;4 TL)	L (6)	L (none)
Stations			
Fullerton	L (none)	--	L (none)
Anaheim	L (none)	--	L (none)
Santa Ana	L (none)	L (2)	L (none)
Irvine	L (none)	--	L (none)
Irvine Station To San Juan Capistrano City Limits(no improvements)	N/A	N/A	N/A

TABLE 4-1

Detailed Analysis/Comparison Table
Utilities Impacts
Los Angeles – Orange County – San Diego (continued)

	Electrical Facilities SS = Substation TL = Transmission Line (H or L)	Natural Gas Lines (H,M,L)	Waste Treatment Facilities (H or L)
San Juan Capistrano (City Limits to Avenida Aeropuerto)			
Alignments			
Covered TRENCH/Cut-Fill between Trabuco Creek and Avenida Aeropuerto (trench goes under San Juan Creek); Double tracking	L (none)	--	L (none)
TUNNEL along I-5 between Hwy 73 and Avenida Aeropuerto (tunnel under Trabuco Creek and San Juan Creek); Double tracking	L (none)	--	L (none)
AT-GRADE and Open TRENCH along east side of Trabuco Creek	L (none)	--	L (none)
Stations			
San Juan Capistrano	L (none)	--	L (none)
Dana Point/San Clemente (Avenida Aeropuerto To San Onofre Power Plant)			
Alignments			
Dana Point Curve Realignment; San Clemente - SHORT TRENCH; Double Tracking (crossing San Mateo and San Onofre Creeks)	L (none)	L (1)	H (1)
Dana Point Curve Realignment; San Clemente - LONG TRENCH; Double Tracking (crossing San Mateo and San Onofre Creeks)	L (none)	L (1)	H (1)
Dana Point Curve Realignment; San Clemente - SHORT TUNNEL; Double Tracking (crossing San Mateo and San Onofre Creeks)	L (none)	L (1)	H (1)
San Clemente - LONG ONE-SEGMENT TUNNEL; Double Tracking (crosses San Mateo and San Onofre Creeks)	L (none)	L (1)	H (1)
San Clemente - LONG TWO-SEGMENT TUNNEL; Double Tracking (crosses San Mateo and San Onofre Creeks)	L (none)	L (1)	H (1)
Stations			
San Clemente	L (none)	--	L (none)
Camp Pendleton (San Onofre Power Plant to Oceanside City Limits - Double tracking; crosses Santa Margarita River)	L (none)	--	H (2)

TABLE 4-1

Detailed Analysis/Comparison Table
Utilities Impacts
Los Angeles – Orange County – San Diego (continued)

	Electrical Facilities SS = Substation TL = Transmission Line (H or L)	Natural Gas Lines (H,M,L)	Waste Treatment Facilities (H or L)
Oceanside/Carlsbad (Oceanside City Limits to Encinitas City Limits)			
Alignments			
Carlsbad - AT-GRADE; double tracking; crosses San Luis Rey, Buena Vista , Aqua Hedionda, and Batiquitos Lagoons	H (2 TL)	--	H (1)
Carlsbad -TRENCH; double-tracking; crosses San Luis Rey, Buena Vista, Aqua Hedionda, and Batiquitos Lagoons	H (2 TL)	--	H (1)
Stations			
Oceanside	L (none)	--	L (none)
Encinitas/Solana Beach (Encinitas City Limits to Solana Beach Station)			
Alignments			
Encinitas - AT-GRADE; Double Tracking; crosses San Elijo Lagoon	L (none)	--	H (1)
Encinitas - SHORT TRENCH; Double Tracking; crosses San Elijo Lagoon	L (none)	--	H (1)
Encinitas - LONG TRENCH; Double Tracking; crosses San Elijo Lagoon	L (none)	--	H (1)
Stations			
Solana Beach	L (none)	--	L (none)
Del Mar(Solana Beach Station to I-5/805 Split)			
Alignments			
COVERED TRENCH on bluffs; crosses San Dieguito and Los Penasquitos Lagoons	L (none)	--	L (none)
TUNNEL under Camino Del Mar; crosses San Dieguito and Los Penasquitos Lagoons	L (none)	--	L (none)
TUNNEL along I-5; crosses San Dieguito and Los Penasquitos Lagoons	L (none)	--	L (none)
I-5/805 Split To Hwy 52			
Alignments			
Miramar Hill Tunnel	L (none)	L (9)	H (1)
I-5 Tunnel	L (none)	L (9)	H (1)
Stations			
UTC (Only applies to Miramar Hill Tunnel)	L (none)	--	L (none)

TABLE 4-1

Detailed Analysis/Comparison Table
Utilities Impacts
Los Angeles – Orange County – San Diego (continued)

	Electrical Facilities SS = Substation TL = Transmission Line (H or L)	Natural Gas Lines (H,M,L)	Waste Treatment Facilities (H or L)
Hwy 52 To Santa Fe Depot (Curve realignment; Double Tracking; San Diego River Bridge; Trench between Sassafras St and Cedar St)	L (none)	L (4)	H (1)
Stations			
Santa Fe Depot	H (1 SS)	--	L (none)

4.1 NO-PROJECT ALTERNATIVE

The No-Project Alternative assumes that others would complete projects including local, state, and interstate transportation system improvements designated in existing plans and programs (refer to Table 1-1), and that impacts to public utilities would be mitigated as part of those projects. No additional impacts to public utilities would occur beyond those addressed in environmental documents for the No-Project Alternative.

4.2 MODAL ALTERNATIVE

The Modal Alternative corridor is crossed in 26 locations by 230 kV transmission lines. The number of crossings and impact levels are shown by route segment in Table 4-1. Although these impacts have been rated as high, it should be noted that these transmission lines currently span the I-5 corridor at a height and span length that accommodates use of the highway; therefore, it is assumed that construction of additional traffic lanes under the Modal Alternative would not require major relocation of these lines. Relocation of some poles or towers, and readjustment of some span lengths would be required in any areas where the freeway right-of-way widening would encroach into the existing transmission line easement(s). No electrical substations were identified within the 200-foot study area of I-5.

High-pressure natural gas pipelines, ranging in diameter from 4 inches to 36 inches, cross the I-5 corridor in 45 locations. Impact levels in the various alignment segments range from low to medium, reflecting the varying number of pipelines crossing the corridor within a segment. It is assumed that further widening of the I-5 corridor would require that gas lines be exposed through excavation and recased. Thus, expected impacts relate to construction cost and should not result in disruption of service.

Water treatment facilities crossing the I-5 corridor include two treated wastewater ocean outfalls in the Camp Pendleton segment and two major sewer trunk lines, one located in the I-5/805 to Highway 52 segment and another in the Highway 52 to Santa Fe Depot segment. All four of these facilities are rated as having a high potential impact due to their large diameter (60 inches and 96 inches for the trunk lines), construction cost to relocate, and the potential for disruption of service during project construction.

4.3 HIGH-SPEED TRAIN ALTERNATIVE

High-Speed Rail

Each of the High-Speed Rail corridors between LAX and Irvine crosses a number of 230kV transmission lines. The alignment from LAX to Union Station crosses 6 lines. The alignment option along the UPRR rail corridor from Union Station to Anaheim crosses 16 lines, and the alternative alignment along the LOSSAN corridor from Union Station to Irvine crosses 19. In addition, one electrical substation is located within the 200-foot study area of the UPRR segment, and one is located in the LOSSAN segment.

Because this transmission infrastructure was built over existing and operating rail corridors (UPRR and LOSSAN), it is assumed that its span and height was designed to accommodate future at-grade rail improvements. Therefore, where the high-speed rail would be constructed at- or below grade, potential impacts to transmission lines would be low. However, medium to high impacts can be expected in some portions of the High-Speed Rail alignments where elevated track would be constructed (LAX to Union Station and Union Station to Anaheim via UPRR segments).

Each of the High-Speed Rail corridors also crosses high-pressure natural gas pipelines, ranging from 3 inches to 36 inches in diameter. Impacts to these natural gas facilities range from low to high depending on the number of gas pipelines identified within a given segment (Table 4-1). The alignment between LAX and Union Station crosses 41 gas lines. The Union Station to Anaheim via UPRR alignment crosses 28 gas lines, and the alternative alignment from Union Station to Irvine via LOSSAN crosses 30. Eight

gas lines are located within the study area for High-Speed Rail stations, including LAX, Norwalk (via UPRR and via LOSSAN), and Santa Ana.

No wastewater treatment facilities were identified in the High-Speed Rail portion of the HST Alternative.

Conventional Rail

Twenty-one 230 kV transmission lines are crossed by the conventional rail portion of the project between Los Angeles and San Diego. Nineteen of these transmission lines are located in the Union Station to Irvine Station segment, leaving the rest of the corridor relatively free of higher voltage electrical facilities. Two substations were identified in the conventional rail portion of the project (one located in the Fullerton to Irvine segment, and one near the Santa Fe Depot in San Diego). Although the presence of any 230 kV transmission lines is shown as a high potential impact in Table 4-1, actual impacts in the conventional rail corridor are likely to be low because the rail pre-dates the electrical infrastructure that has been developed around the existing and operating LOSSAN rail corridor.

High-pressure natural gas pipelines, ranging in diameter from 4 inches to 30 inches, are crossed by the conventional rail alignment options in 44 locations. These gas lines are distributed among five different corridor segments (Table 4-1) such that construction activities in all but one segment would result in low or no impacts. Only in the Union Station to Fullerton Station segment, where 24 gas lines were identified, are impacts considered to be medium. It is assumed that any construction in the corridor would result in gas lines being exposed through excavation and recased. Additional impacts to gas pipelines could result in areas where tunneling and trenching require minor or major relocations, or where utilities are excluded from the corridor. Tunneling and trenching may occur in the Conventional Rail corridors in the Union Station to Fullerton segment (24 gas pipelines), Fullerton to Irvine Station segment (6 gas pipelines), Dana Point/San Clemente segment (1 gas pipeline), I-5/805 Split to Highway 52 segment (9 gas pipelines), and the Highway 52 to Santa Fe Depot segment (4 gas pipelines). In most cases, the impacts relate to construction cost and time, and should not result in disruption of service.

Wastewater treatment facilities intersecting the conventional rail corridor include five treated wastewater ocean outfalls and two major sewer lines. The ocean outfalls are located in the Dana Point/San Clemente segment (1), Camp Pendleton segment (2), Oceanside/Carlsbad segment (1), and the Encinitas/Solana Beach segment (1). Major sewer lines include a 60-inch-diameter line that enters the rail corridor in the I-5/805 Split to Highway 52 segment and parallels it to the Airport pump station and a 96-inch trunk line in the Highway 52 to Santa Fe Depot segment. Impacts to ocean outfalls and sewer trunk lines are rated as high due to high relocation impacts because of their large diameter, high construction costs and time, and potential for service interruption.

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APPENDIX A

Appendix A
Conventional Rail Route Combinations for Impact Comparison

As described in Chapter 1 of this Technical Evaluation, there are numerous alignment and construction options in the Conventional Rail portion of the High-Speed Train Alternative for the Los Angeles – Orange County – San Diego Region. To allow a reasonable comparison of impacts among the No Build, Modal, and High-Speed Train Alternative, the Conventional Rail improvement options are summarized by showing a range of potential impacts (Table 1-4, Chapter 1). This range is represented by two of many possible route combinations between Union Station and San Diego: (1) a Higher Level Infrastructure route, and (2) a Lower Level Infrastructure route. The Higher Level route is based on combining the alignment/construction options (one from each sub-segment) that would involve the most extensive infrastructure investment and/or construction complexity. For example, where a sub-segment has both an at-grade option and a trenching option in the same general alignment, the trenching option was used for the Higher Level route, and the at-grade option was used in the Lower Level route. Where two tunnel options are the only options in one sub-segment, the longer tunnel was included in the Higher Level route. In this way, a range of potential impacts could be bracketed to allow a valid comparison of the High-Speed Train Alternative to the No Build and the Modal Alternative.

The specific alignment and construction options included in both the Higher and the Lower Level routes are shown in Tables A-1 and A-2. These representative routes do not include any of the options that were eliminated from further consideration during the LOSSAN screening process. It must be emphasized that these routes serve only to provide a reasonable range of impacts for comparative purposes. They do *not* represent any selection of a particular option as preferred. No selection of preferred alignment options will be done until subsequent stages of this project.

Table A-1
LOWER LEVEL INFRASTRUCTURE IMPROVEMENTS

CONVENTIONAL RAIL (LOSSAN) & STATION OPTIONS
Union Station To Fullerton Station (4th main track)
Fullerton Station To Irvine Station
Alignment
AT-GRADE between Walnut Ave (Orange) and E. 17th St. (Santa Ana)
Stations
Fullerton
Anaheim
Santa Ana
Irvine
Irvine Station To San Juan Capistrano City Limits(no improvements)
San Juan Capistrano (City Limits to Avenida Aeropuerto)
Alignment
AT-GRADE and Open TRENCH along east side of Trabuco Creek
Stations
San Juan Capistrano (New, below-grade station)
Dana Point/San Clemente (Avenida Aeropuerto To San Onofre Power Plant)
Alignment
Dana Point Curve Realignment; San Clemente - SHORT TUNNEL; Double Tracking (crossing San Mateo and San Onofre Creeks)
Stations
San Clemente (New Station – location to be determined)
Camp Pendleton (San Onofre Power Plant to Oceanside City Limits - Double tracking; crosses Santa Margarita River)
Oceanside/Carlsbad (Oceanside City Limits to Encinitas City Limits)
Alignments
Carlsbad - AT-GRADE; double tracking; crosses San Luis Rey, Buena Vista , Aqua Hedionda, and Batiquitos Lagoons
Stations
Oceanside
Encinitas/Solana Beach (Encinitas City Limits to Solana Beach Station)
Alignment
Encinitas - AT-GRADE; Double Tracking; crosses San Elijo Lagoon
Stations
Solana Beach
Del Mar(Solana Beach Station to I-5/805 Split)
Alignment
TUNNEL under Camino Del Mar; crosses San Dieguito and Los Penasquitos Lagoons
I-5/805 Split To Hwy 52
Alignment
I-5 Tunnel
Hwy 52 To Santa Fe Depot (Curve realignment; Double Tracking; San Diego River Bridge; Trench between Sassafras St and Cedar St)
Stations
Santa Fe Depot

Table A-2
HIGHER LEVEL INFRASTRUCTURE IMPROVEMENTS

CONVENTIONAL RAIL (LOSSAN) & STATION OPTIONS
Union Station To Fullerton Station (4th main track)
Fullerton Station To Irvine Station
Alignment
TRENCH between Walnut Ave (Orange) and E. 17th St. (Santa Ana)
Stations Fullerton Anaheim Santa Ana Irvine
Irvine Station To San Juan Capistrano City Limits(no improvements)
San Juan Capistrano (City Limits to Avenida Aeropuerto)
Alignment
TUNNEL along I-5 between Hwy 73 and Avenida Aeropuerto (tunnel under Trabuco Creek and San Juan Creek); Double tracking
Dana Point/San Clemente (Avenida Aeropuerto To San Onofre Power Plant)
Alignment
San Clemente - LONG TWO-SEGMENT TUNNEL; Double Tracking (crosses San Mateo and San Onofre Creeks)
Stations
San Clemente (New below-grade station between tunnel segments)
Camp Pendleton (San Onofre Power Plant to Oceanside City Limits - Double tracking; crosses Santa Margarita River)
Oceanside/Carlsbad (Oceanside City Limits to Encinitas City Limits) Alignment
Carlsbad -TRENCH; double-tracking; crosses San Luis Rey, Buena Vista, Aqua Hedionda, and Batiquitos Lagoons
Stations
Oceanside
Encinitas/Solana Beach (Encinitas City Limits to Solana Beach Station)
Alignment
Encinitas - SHORT TRENCH; Double Tracking; crosses San Elijo Lagoon
Stations Solana Beach
Del Mar(Solana Beach Station to I-5/805 Split)
Alignment
TUNNEL along I-5; crosses San Dieguito and Los Penasquitos Lagoons
I-5/805 Split To Hwy 52
Alignment
Miramar Hill Tunnel
Stations UTC
Hwy 52 To Santa Fe Depot (Curve realignment; Double Tracking; San Diego River Bridge; Trench between Sassafras St and Cedar St)
Stations
Santa Fe Depot